IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
Group Art Unit 3742

In re Patent Application of:

Gary J. Craw et al.

Serial No.: 10/719,694

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Examiner: John A. Jeffery

"VENTILATING AND HEATING APPARATUS AND METHOD"

I, Ellen R. Webb, hereby certify that this correspondence is being deposited with the US Postal Service as first class mail in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the date of my signature.

Ellen R. Webb
Signature

September 11, 2006
Date of Signature

DECLARATION OF KENNETH J. JONAS UNDER 37 C.F.R §1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

1. I am a citizen of the United States and reside in Mequon, Wisconsin.

2. I am a joint inventor of the invention described and claimed in the above-identified non-provisional patent application ("the patent application").

3. At all times relevant to the statements made herein, I was employed by Broan-NuTone LLC.

4. During the development of the apparatus described and claimed in the patent application, particular ratios of the cross-sectional area of the discharge duct at the heater to the cross-sectional area of the discharge duct at the outlet yielded unexpected and beneficial results. More specifically, a ratio of the cross-sectional area at the heater to the cross-sectional area at the outlet of no greater than 4 to 1 and no less than 1.125 to 1 (as currently specified by Claims 20 and 47) yielded unexpected and beneficial results.

5. In conventional devices, large, uniform discharge ducts are generally used. In other words, the cross-sectional area at the heater is approximately equal to the cross-sectional area at the outlet of the discharge duct. The large, uniform discharge ducts generally blow more air past the heater. The heater is cooled and the air is warmed. The warm air is then blown into the room.

6. Our first design using large, uniform discharge ducts did not result in efficient cooling of the heater. The inefficient cooling of the heater resulted in overheating and "red spots" on the heater and/or the discharge duct.

7. In our second design using large, uniform discharge ducts, we raised the velocity of the air by increasing the speed of the blower fan in an attempt to eliminate the red spots. This was not successful. Rather, some areas of the discharge duct and the heater were cooler, while other areas still overheated producing "red spots."

8. In our third design, we reduced the cross-sectional area of the discharge duct to raise the air velocity near the heater. Rather than increasing the cross-sectional area of the discharge duct incrementally until the overheating and "red spots" were eliminated (which would be intuitive if one were merely experimenting to achieve results), we reduced the cross-sectional area to increase the localized velocity around the heater.

9. Reducing the cross-sectional area of the discharge duct did eliminate the "red spots" but introduced noise and vibration due to resonance. Rather than increasing the cross-sectional area of the discharge duct incrementally until the resonance disappeared (which would also be intuitive if one were merely experimenting to achieve results), we reduced the cross-sectional area of the discharge duct even further in our fourth design. However, with a discharge duct having a uniform cross-sectional area along substantially its entire length, it was difficult to eliminate the resonance.

10. In our fifth design, we kept the cross-sectional area at the heater relatively small to eliminate the "red spots," and we tapered the cross-sectional area from the heater to the outlet of the discharge duct. This taper created a nozzle effect, which projected the warm air away from the apparatus and further into the room. While providing increased velocity at the outlet of

the discharge duct, we also eliminated the noise due to resonance and the "red spots" due to overheating. While the nozzle effect increased the velocity at the outlet of the discharge duct, it did so at some cost to the upstream velocity. If we would have decreased the cross-sectional area at the outlet only, any "red spots" present near the heater would have gotten worse due to decreased air velocity around the heater.

11. The following unexpected and beneficial results were achieved by using certain ratios of the cross-sectional area at the heater to the cross-sectional area at the outlet: (a) the "red spots" were eliminated; (b) the air velocity at the outlet of the discharge duct and into the room was improved (so that the warm air would reach a person standing further from the outlet); and (c) the resonance in the apparatus was eliminated, resulting in near silent operation. More specifically, a ratio of the cross-sectional area of the discharge duct at the heater to the cross-sectional area of the discharge duct at the outlet of no greater than 4 to 1 and no less than 1.125 to 1 yielded the above-noted unexpected and beneficial results.

12. The facts set forth in this Declaration are relied upon to establish the nature of the results in performance as unexpected due to the particular design strategies described herein. Furthermore, the result of the sum of design attributes was greater than the sum of results obtainable by manipulating single attributes from the previous design.

13. I have reviewed U.S. Patent No. 1,644,595 issued to Karg (hereinafter "Karg") and have made the following conclusions. Karg teaches a first embodiment shown in Figs. 1-4, a second embodiment shown in Figs. 5-9, and a third embodiment shown in Fig. 10. The measurements discussed in this paragraph were taken by directly measuring the drawings of the Karg patent document as printed on 8.5" x 11" paper. In the casing (20) of Figs. 1-4, the duct at the heater (41) has a cross-sectional area of approximately 147 mm^2 (7.0 mm x 21.0 mm). The duct at the outlet (end of spout 38) has a cross-sectional area of approximately 20.25 mm^2 (4.5 mm x 4.5 mm). As a result, the ratio of the cross-sectional area of the duct at the heater to that at the outlet is approximately 7.3:1 (147 mm^2 divided by 20.25 mm^2). In the casing (48) of Figs. 5-9, the duct at the heater has a cross-sectional area of approximately 185.5 mm^2 (7.0 mm x 26.5 mm). The duct at the outlet (end of spout 56) has a cross-sectional area of approximately 28 mm^2 (4.0 mm x 7.0 mm). As a result, the ratio of the cross-sectional area of the duct at the

the heater is the same as the first embodiment of Figs. 1-4. As a result, the ratio of the cross-sectional area of the duct at the heater to the cross-sectional area at the outlet is approximately 7.3:1 in the casing (59) of Fig. 10. Therefore, Karg teaches only ratios significantly greater than 4:1 and does not teach or suggest any casing with a ratio less than 4:1.

14. I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further, that these statements were made with the knowledge that willful false statements and the like are punishable by fine and imprisonment, or both, under §1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing therefrom.

Signed, at Hartford, State of Wisconsin, this 9th day of ~~July,~~ August 2006

By: Kenneth J Jonas
Kenneth J. Jonas

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